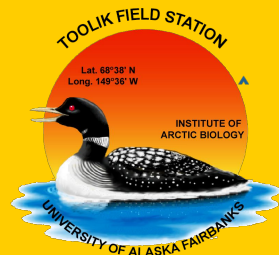


January 2025



2024 Environmental Data Center Report

Oct 1, 2023 – Sep 30, 2024 Report
Amanda Young

EDC Mission Statement



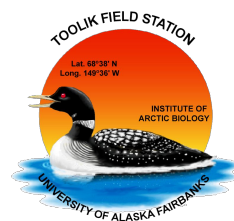
- The EDC was developed to meet the needs of the scientific community.
- Mission:
 - Collect and manage long-term baseline environmental and biological data
 - Maintain a suite of common-use lab and field equipment
 - Assist in the collection of data through fieldwork assistance & Remote Access





Staffing

EDC Year-round Staff



Amanda Young – Spatial and Environmental Data Center Manager

- PhD in physical geography
- Enjoys working with plants and data

Mayra Melendez-Gonzalez – EDC Technician

- BS in Biological Sciences
- Background in Arctic and alpine ecology with a keen skillset in instrumentation and aquatic sampling

Abby Jackson – EDC Technician

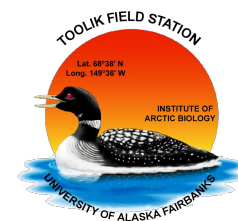
- MS in Ecology
- Background in soils ecology of cold climates with a special inkling for nematodes

Colin Edgar – Met Station Technician (0.25 time)

- Background in instrumentation, renewable energy, and eddy covariance measurements



Seasonal Staff



Seasonal Technicians

- Sara de Sobrino
 - Plant ecology
- Lela Forester
 - UAF undergraduate student in Natural Resource Management

Naturalist

- Seth Beaudreault
 - Animal and birder extraordinaire
 - Worked at Toolik since 2014





Data and Equipment Use

Naturalist Journal

- Remains the top page from the TFS website to be visited.
- Consistent viewership over the past three years.

Year	Views	Unique IP's	Time Viewing	Interactions
2021-2022	10,803	1,754	5m 37s	29,918
2022-2023	12,016	2,067	5m 45s	33,711
2023-2024	11,922	1,521	7m 07s	31,177

TFS Naturalist Journal

Date of Journal

2024-05-15

<< first

< previous

next >

last >>

Wednesday, 15 May 2024 at 7:51 pm.

Share this entry

General Comments

A stiff wind picked up overnight and continued through the day, blowing more ducks and shorebirds up from the south. I went down toward the mountains this morning thinking maybe I'd find a new songbird singing in the willows but all the stages were quiet as the performers hunkered down in what little shelter was available. At the Pump 4 pond I found a pair of Lesser Yellowlegs crouched in the shoregrass, leaning into the wind with beaks pointed like compass needles to the south.

North of camp the wind was a little weaker and the wildlife more abundant. A pair of Redhead, uncommon visitors from the Scaup family of ducks, joined some Greater Scaup, Northern Pintails, and other ducks and geese near Pump Station 3. The Muskox were feeding lazily on short shrubs along the Sag, the recently born calf still not straying far from mother. A feisty little Merlin, the chihuahuas of the raptors, perched on a piece of scientific equipment near Ice Cut, and a Common Raven defending its nearby nest site harassed a much larger Golden Eagle who flew heavily off to unburden itself of the corvid.

A few shorebird species were picking through roadside ditch muck: American Golden Plovers, Long-billed Dowitchers, Baird's and Pectoral Sandpipers, and Red-necked Phalaropes. A flock of seven Whimbrel, having arrived from picking along the beaches of Central and South America, flew in over the Brooks Range, somehow looking just as home here as in their tropical wintering grounds.

Lepland Longspurs blew over the landscape in flocks of a few dozen between camp and Oksrukuyik Creek, picking at windblown seeds on the surface of the snow. -Seth



Caribou

Photo credit: ©Seth Beaudreault

TFS / EDC / Naturalist Journal / TFS Naturalist Journal

Daily Metrics for 15 May 2024

Air Temperature
-50 45°F (7°C) 80

Wind Speed
0 16mph 80

Wind Direction
S

Cloud Cover
0 6-35% 100

Snow Cover
0 65-94% 100

Greenness
0 0 5

Fall Colors
0 0 5

Ice on Lake
0 100% 100

Ice on Inlet River
0 100% 100

See Brooks Range: Yes

Aurora seen: No

Snowed today: No

Inlet river flowing: No

Ground fog: No

Moat around lake: No

Moat width:



Data Usage















EDC Webpage and Direct Requests

- Met station data requests 632  by 72  1591 

 File
 Downloads
 People
 Views

Arctic Data Center (data has DOI)

- | | | | | |
|--------------------------------|-----|---|-----|---|
| • Phenology | 189 |  | 371 |  |
| • Bird Point Counts | 154 |  | 79 |  |
| • Met Station data | 15 |  | 49 |  |
| • Naturalist Journal – Birds | 0 |  | 80 |  |
| • Naturalist Journal – Mammals | 32 |  | 70 |  |
| • Naturalist Journal – Insects | 0 |  | 66 |  |



NSF
**ARCTIC
Data
Center**

Phenology and Bird Point count datasets updated
Met Station and Naturalist Journal occurring post new years



Arctic Data Center Portal



Hosted by the Arctic Data Center

Sign in with ORCID



Toolik Field Station

The Toolik Field Station (TFS) has been a major site for research in the North American Arctic since 1975. Much of what is known about structure and function of arctic terrestrial and aquatic ecosystems, effects of climate change, and feedbacks to global climate has emerged from long term, process-based ecological research at TFS. This portal provides access to datasets collected as part of the Toolik Field Station program.

About

People

Publications

Data

Metrics

About the Toolik Field Station



Overview

Funding

Connect

For more information about Toolik Field Station, please see our main [website](#).

Overview

The Toolik Field Station (TFS) has been a major site for research in the North American Arctic since 1975. Much of what is known about structure and function of arctic terrestrial and aquatic ecosystems, effects of climate change, and feedbacks to global climate has emerged from long term, process-based ecological research at TFS. TFS-based work has resulted in significant discoveries on adaptations of organisms to the Arctic and population-level changes in animal and plant distributions and phenologies. Because climate is changing rapidly in the Arctic, continuing research into mechanisms of ecosystem response and feedbacks is a high priority. This need and ongoing interest by scientists from many disciplines in use of TFS promise a steady demand for TFS science support in the future. TFS supports the Arctic Long-Term Ecological Research program (LTER), projects in the Arctic Observatory Network program (AON), NASA's Arctic Boreal Vulnerability Experiment (ABOVE), the Earthscope Transportable Array, and is a core site for the National Ecological Observatory Network program (NEON). TFS is a founding partner in the EU-sponsored International Network for Terrestrial Research and Monitoring in the Arctic (INTERACT), which links field stations around the circumpolar Arctic, and a member of the Organization of Biological Field Stations (OBFS). At least 993 peer-reviewed journal articles, 161 books or book chapters and 144 dissertations and theses have been published on research based at TFS.

41 datasets added in 2024



Toolik Field Station

The Toolik Field Station (TFS) has been a major site for research in the North American Arctic since 1975. Much of what is known about structure and function of arctic terrestrial and aquatic ecosystems, effects of climate change, and feedbacks to global climate has emerged from long term, process-based ecological research at TFS. This portal provides access to datasets collected as part of the Toolik Field Station program.

About

People

Publications

Data

Metrics

Search

Search these datasets



Search

Key Words

Key Words



Author Names

Author Names



Year

1950 to 2024

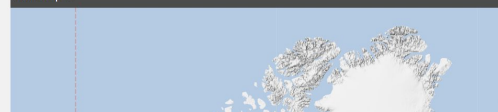
DATASETS 1 TO 25 OF 532

1 2 3 ... 22 Next

Sort by Most recent

Rachel Harris, Sarah Evans, Scott Marshall, Sarah Godsey, Brandon Yokeley, Clara Chew, Emma Ferm, Key Hatch, & Noah Caldwell. (2024). *InSitu and Ground Penetrating Radar (GPR) Data on a Continuous Permafrost Hillslope in the Galbraith Lake Basin*. 2022 -

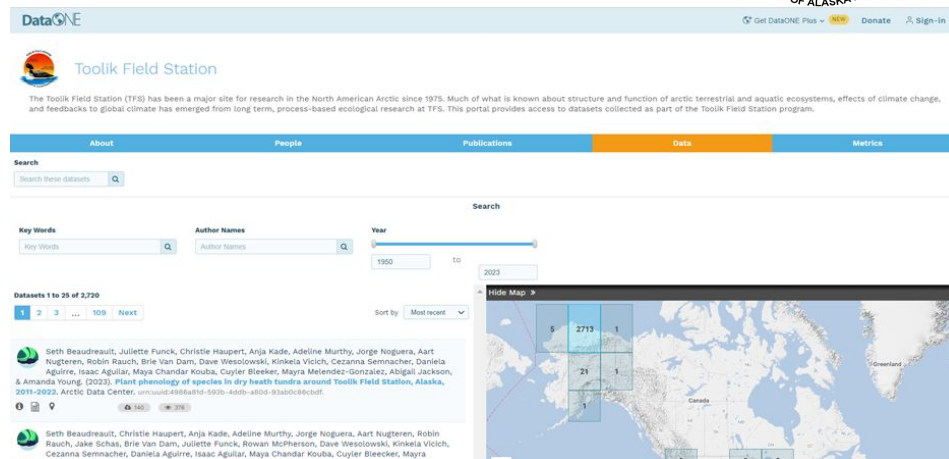
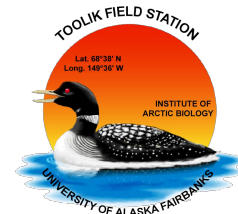
Hide Map



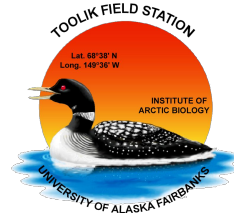
Toolik Arctic Data Center portal

DataOne Toolik Portal

- Working with DataONE programmers, we duplicated the Arctic Data Center (ADC) portal to encompass all of DataONE repositories
 - ADC, EDI, NEON, USGS, LTER, etc.
 - Datasets in the portal grew from 532 datasets in the ADC portal to 2768 datasets!
- If these portals are used and appreciated by the community, we will keep them up.





[Toolik DataONE portal](#)



Data and Equipment in Use in Publications

Recovery of metabolites via subnivean photosynthesis in Arctic tundra plants: Implications for climate change

Nicholas Wright-Osment¹ | Christina Lynn Staudhammer¹  |
Steve Oberbauer² | Behzad Mortazavi¹ | Gregory Starr¹ 

Arctic Heatwaves Could Significantly Influence the Isoprene Emissions From Shrubs

Hui Wang¹ , Allison Welch¹ , Sanjeevi Nagalingam¹ , Christopher Leong¹ ,
Pitchayawee Kittitananuvong¹, Kelley C. Barsanti^{2,3} , Rebecca J. Sheesley⁴ , Claudia I. Czimczik¹ ,

Photofate of Tetrabromobisphenol-A in the Arctic: Role of photofluence and dissolved organic matter

Robyn C. O'Halloran , Jill Kerrigan , Lauren E. O'Connor , Jennifer J. Guerard , Kimberly J. Hageman ,
and Yu-Ping Chin 

Wolverine population density and home range size in Arctic Alaska

Thomas W. Glass¹  | Martin D. Robards²

Decoupling of redox processes from soil saturation in Arctic tundra








Erin C. Rooney , Erin VanderJeugd¹, Sumant Avsarala , Imtiaz Miah , Matthew J. Berens ,
Lauren Kinsman-Costello², Michael N. Weintraub  & Elizabeth M. Herndon 

88 publications in 2021
84 publications in 2022
66 publications in 2023
72 publications in 2024

Direction Finding Studies of Simultaneous Auroral $2f_{ce}$ and $3f_{ce}$ Roar Cyclotron Harmonic Radio Emissions

T. M. Godfrey¹  and J. LaBelle¹ 

Effects of short- and long-term experimental warming on plant-pollinator interactions and floral rewards in the Low Arctic

Roxaneh S. Khorsand , Flavia Sancier-Barbosa , Jeremy L. May , Toke T. Høye , and Steven F. Oberbauer 

Common Use Equipment



New Equipment

- New federal snow auger
- Ultrasonic cleaner

New to the EDC

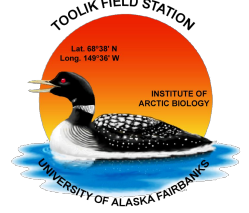
- Ekman Grab Sampler - rehab
- Peristaltic pumps
- Few types of fishing nets
- Laminar flow fume hood
- Russian Peat Borer
- Soil Recovery Probes
- Vacuum Pump

Suggested new equipment

- New freeze dryer
- Shelf for the muffle furnace
- LI-600 fluorometer/ porometer



Science SCUA

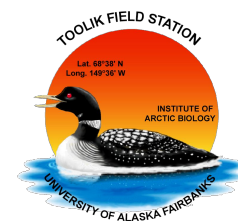


Lightly used, or never used lab and field supplies:
pin flags, nalgene bottles, glassware, scint vials,
pipette tips, syringes, etc.



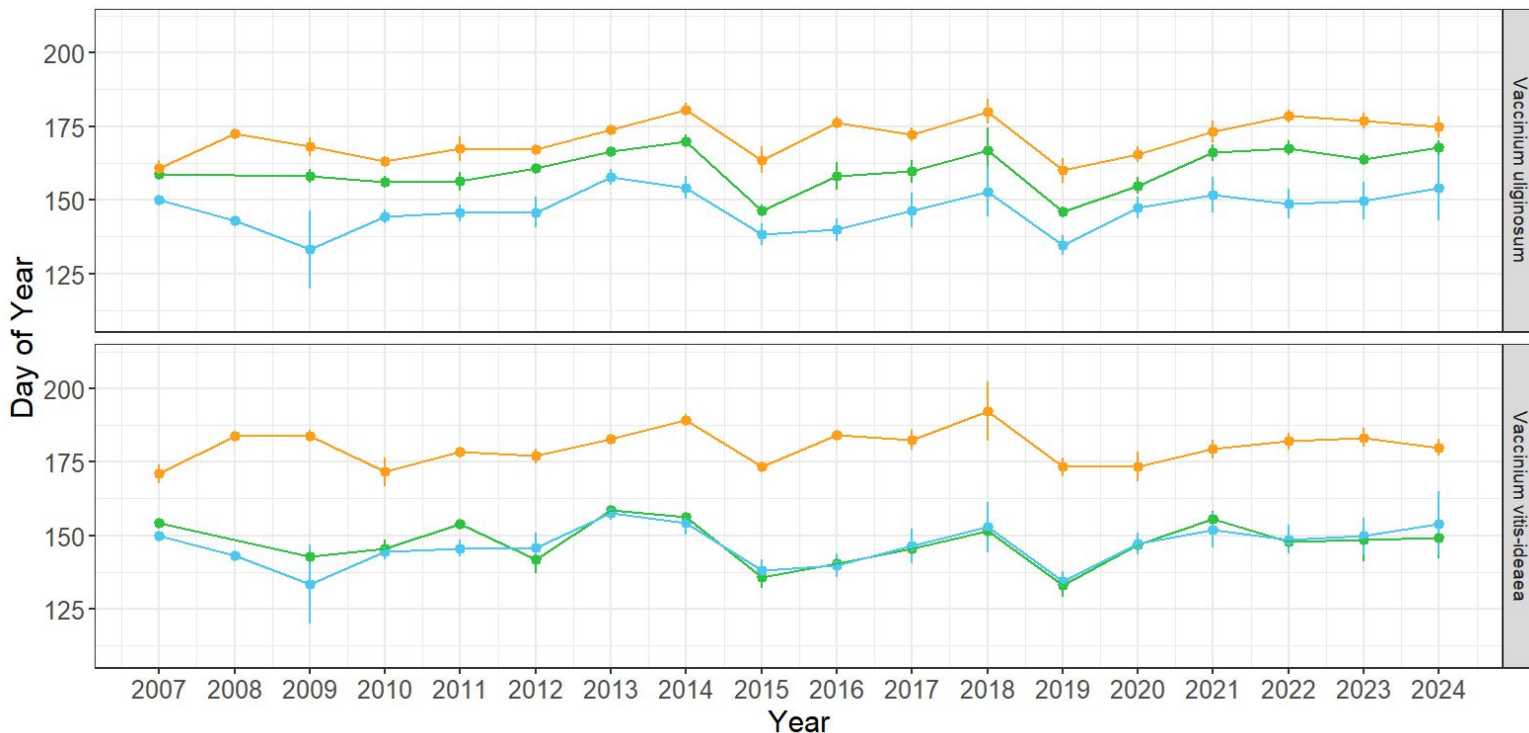
Baseline Monitoring Biotic

Biological Monitoring - Phenology

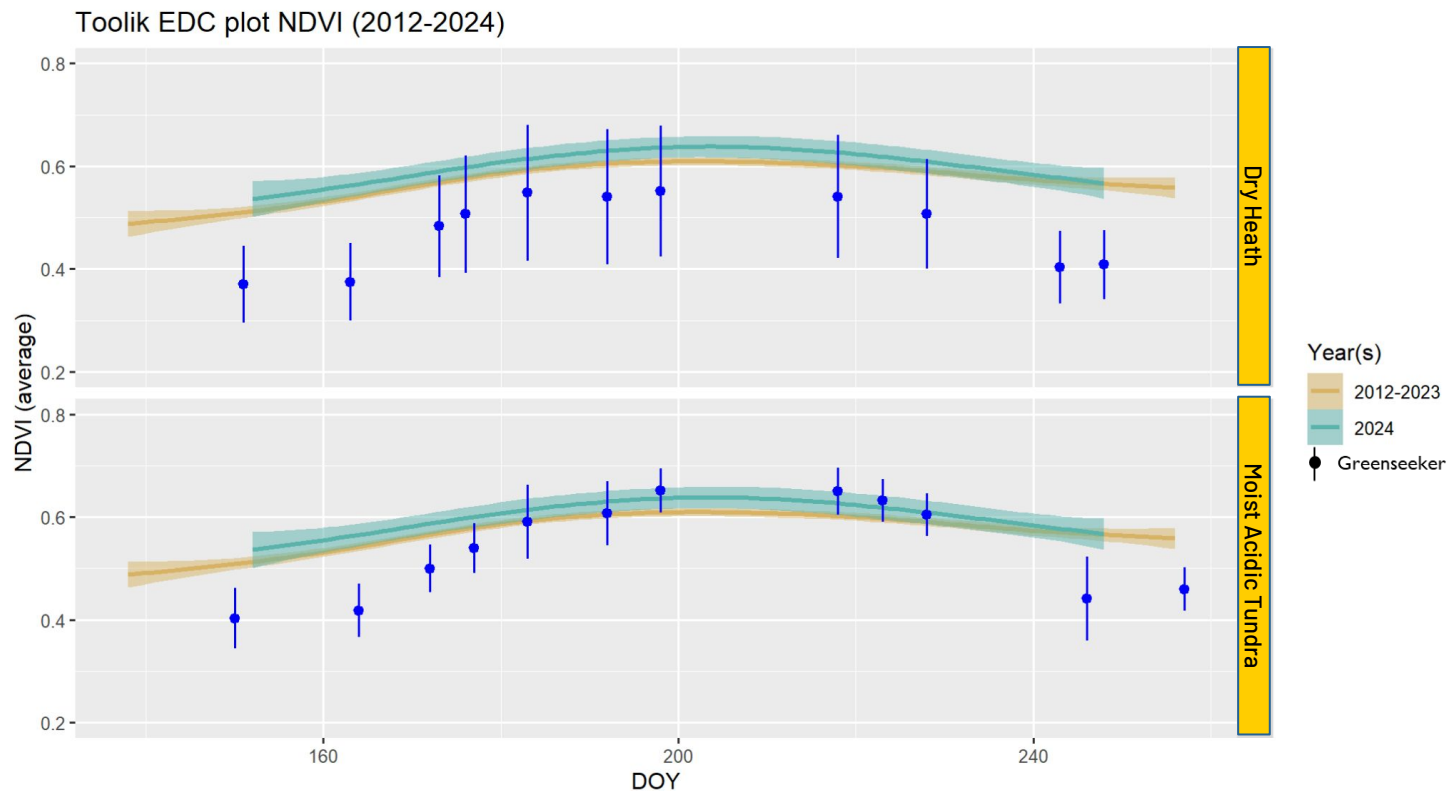


Phenophase

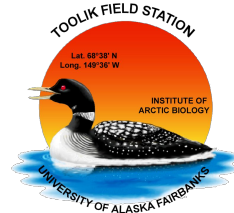
- First Leaf
- First Flower Open
- Snow Free



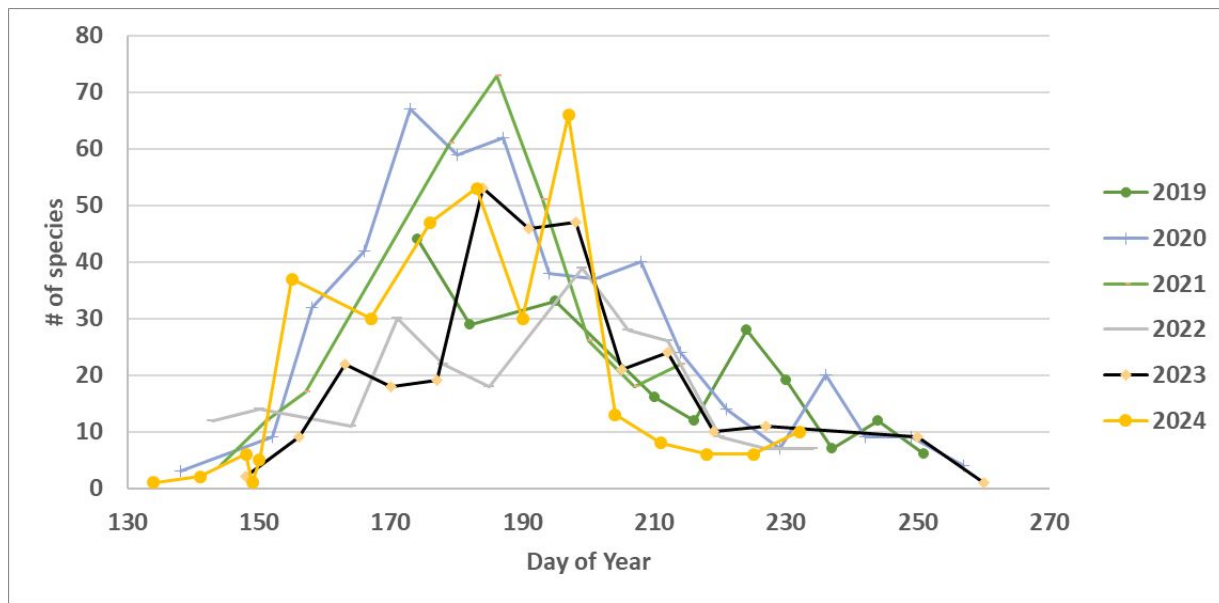
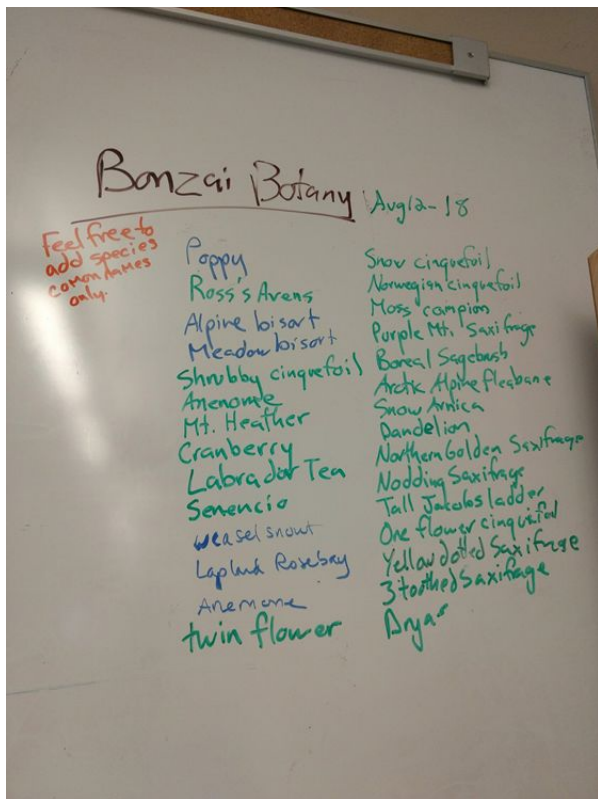
Biological Monitoring - NDVI



Biological Monitoring - Bonsai Botany



- Recorded plants in flower during each week
- Common names only so all can participate

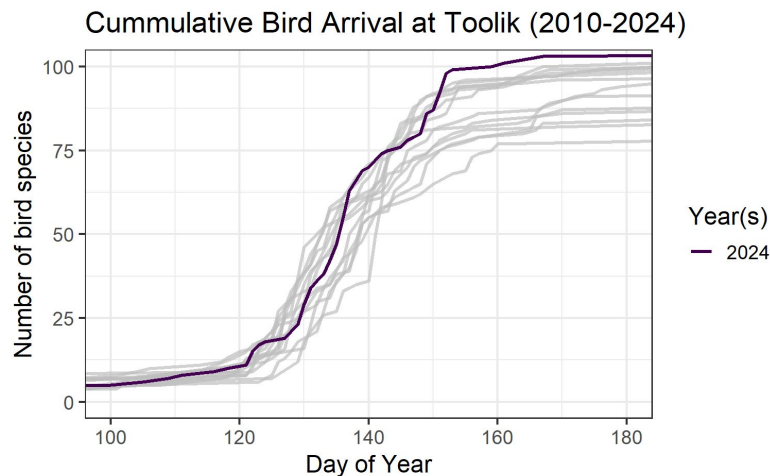
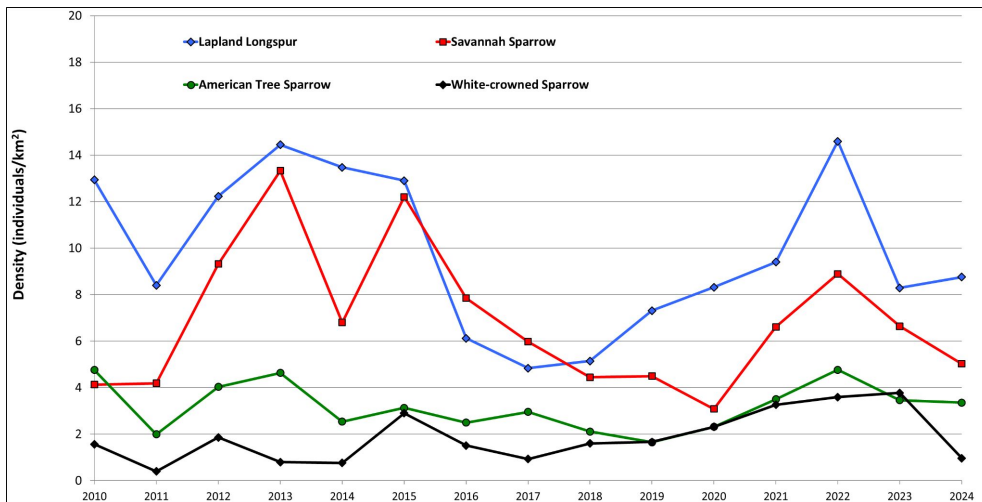


Biological Monitoring - Avian



- Avian point counts

- Date of arrival of bird species from the Naturalist Journal



Biological Monitoring - Audio Recordings



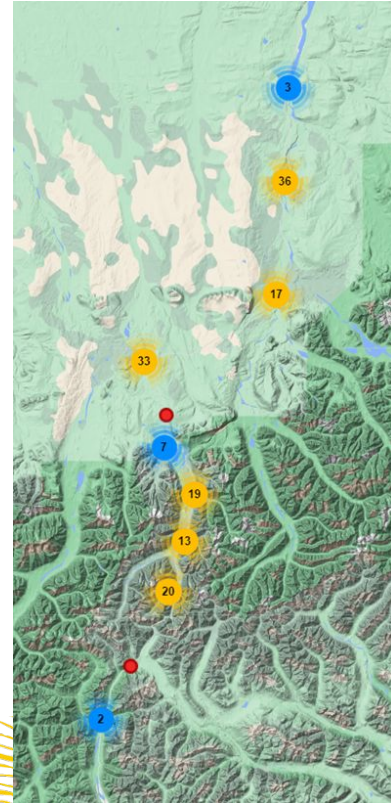
- Audio recording of bird species continues now with 252 recordings from the Toolik area
 - Up from 212 last year
 - Calls are added to the Naturalist Bird Guide



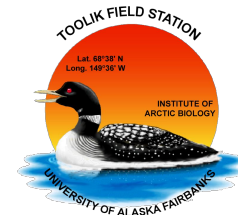
[Northern waterthrush, June 2022](#)



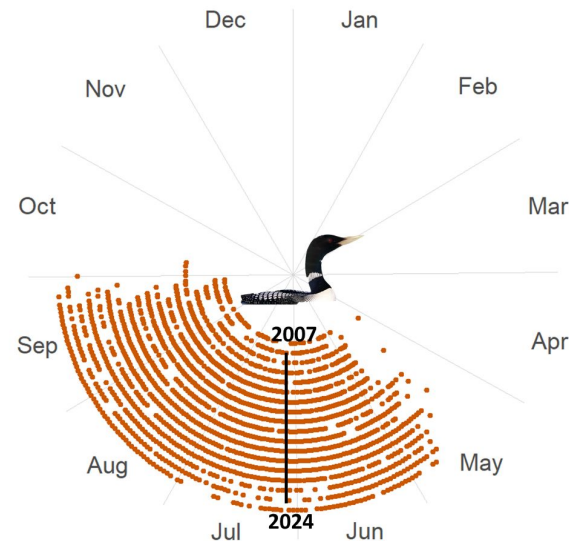
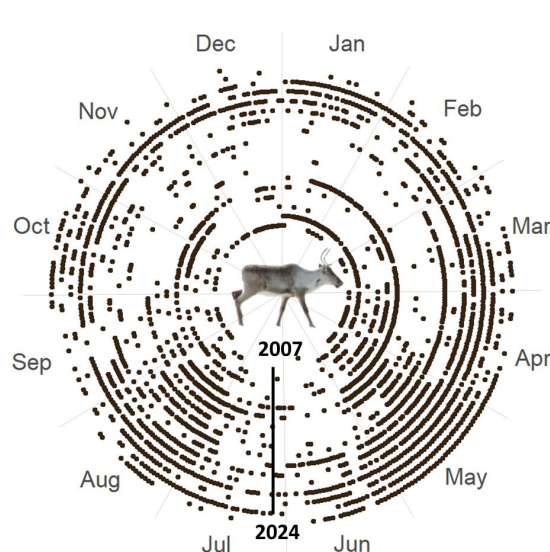
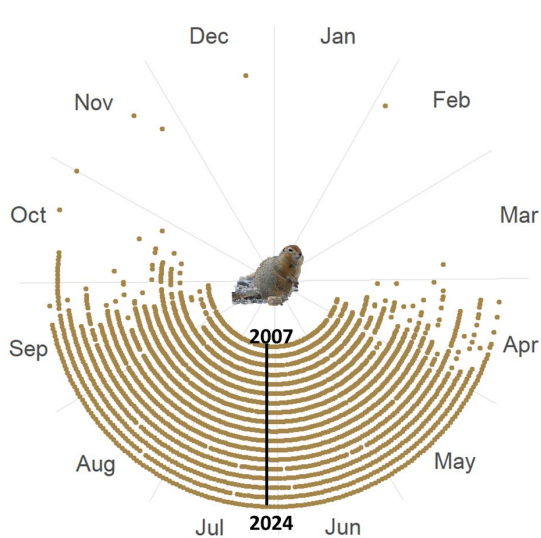
[Surfbird \(Mt Dalton\), June 2022](#)



Biological Monitoring - Animal Observations



- Daily observations from the Naturalist Journal showing observed presence on the landscape.
 - Each ring is a year and each dot is a daily observation.



[Interactive Animals & Birds Tool](#)

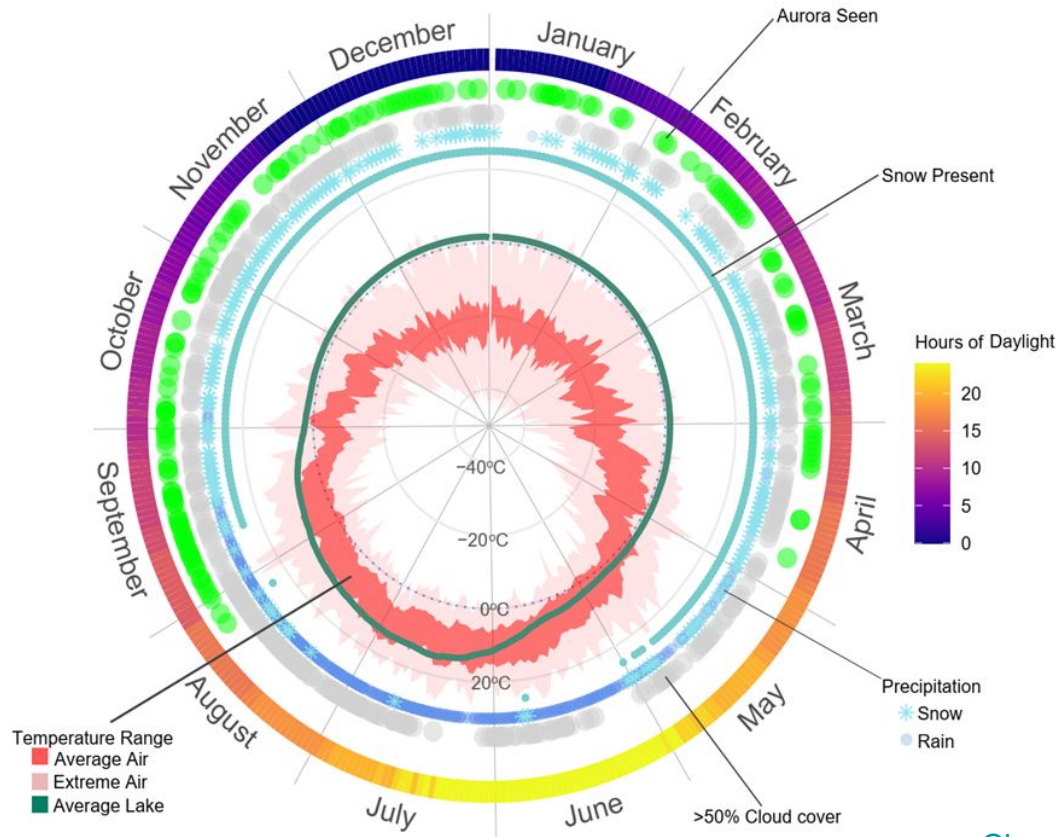




Baseline Monitoring Abiotic

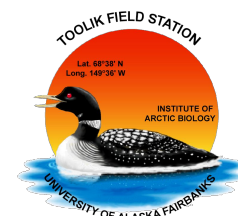
Through the year at Toolik

Data from the TFS Met Station and Naturalist Journal (2007-2021)

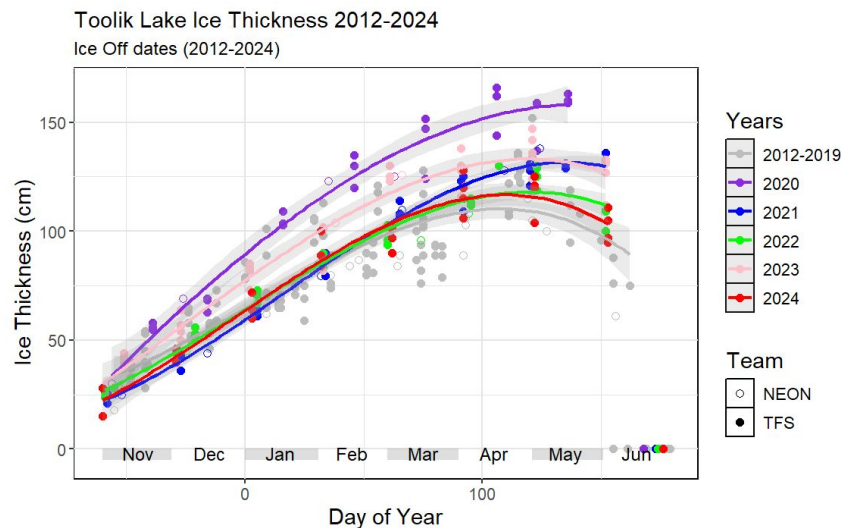


[Circular Seasonality Plots GitHub code](#)

Abiotic Measurements - Ice Thickness

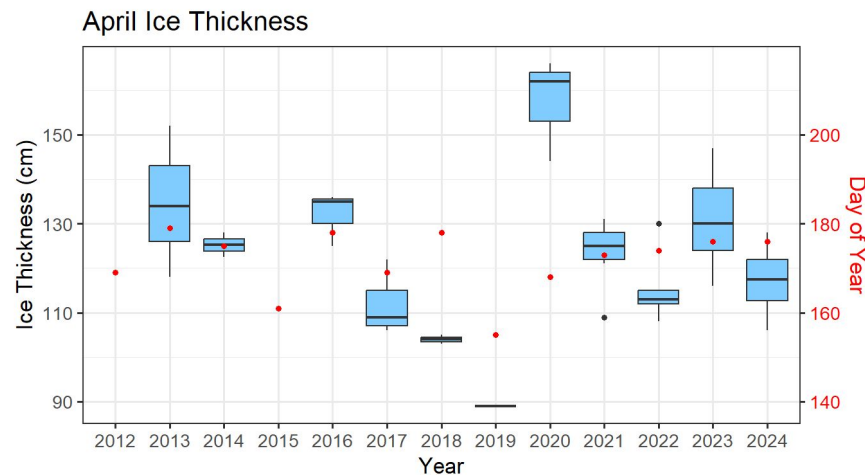


- Ice thickness - measured monthly



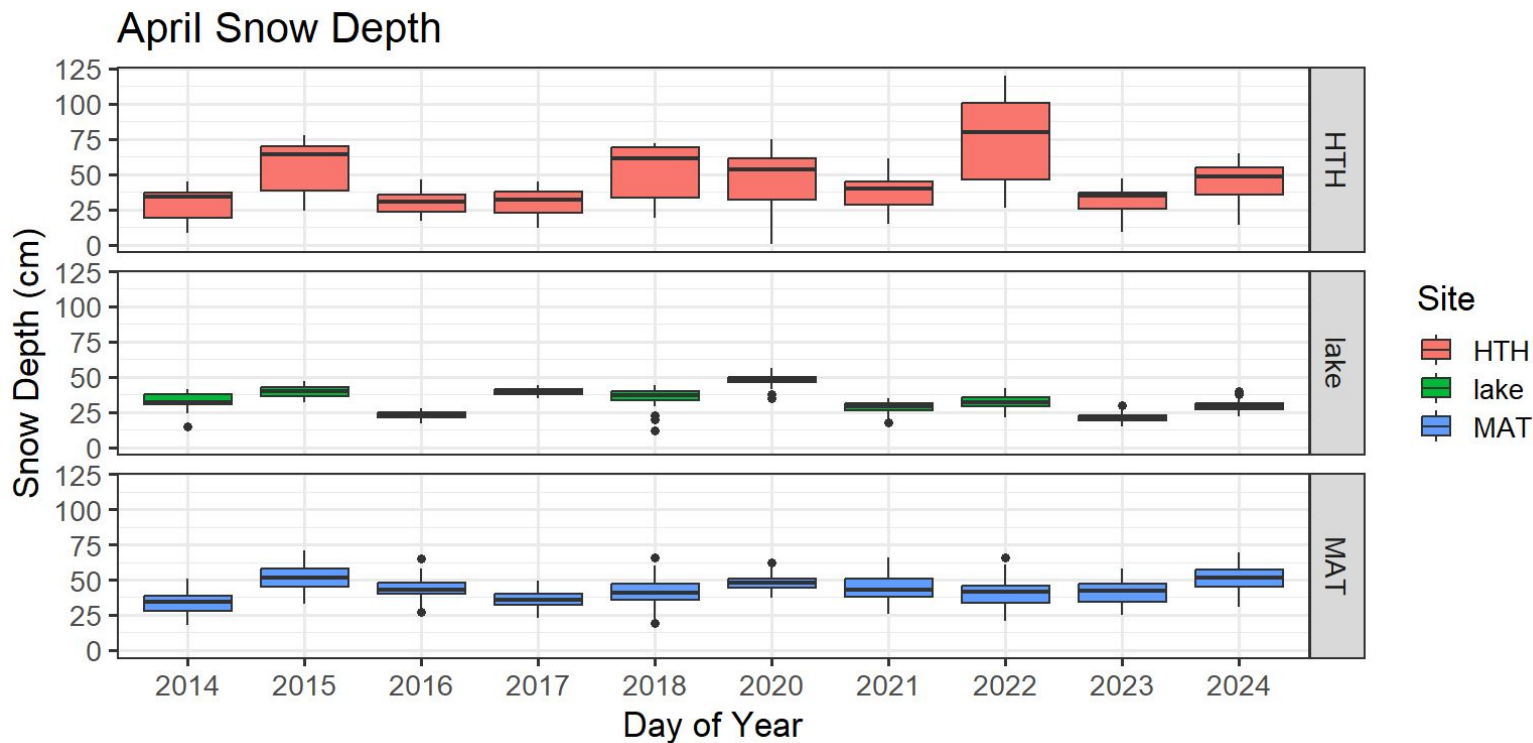
NEON = National Ecological Observatory Network. 2024. Data Product DP1 20254 001. Depth profile at specific depths. Provisional data downloaded from <http://data.neonscience.org> on Sept 15, 2024. Battelle, Boulder, CO, USA NEON. 2024.

- Peak ice thickness, measured in April

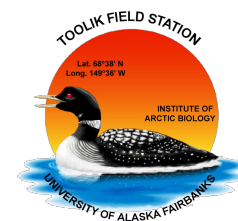


Red dots are dates of ice off (secondary y-axis)

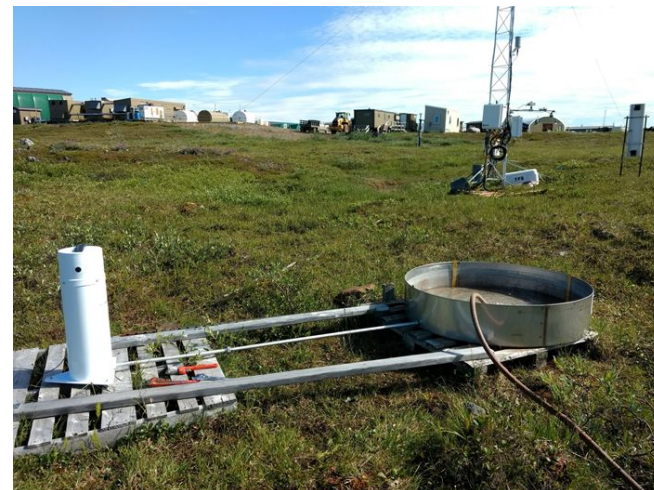
Abiotic Monitoring - April Snow Depth



Met Station Report



- TFS Meteorological Data updates
 - In 2024 QAQC began to occur quarterly. Final quarter of 2024 is in progress.
- Frequent communication between Colin Edgar and other EDC staff to troubleshoot issues and installation as they arise.
- Sensor Upgrades in 2024
 - DC power to Toolik Main Met Station and Flux Hut
 - Data Logger installed at Flux Hut
 - Leveling Flux Hut Tower



Climate Summaries and Comparisons



Climate Summaries

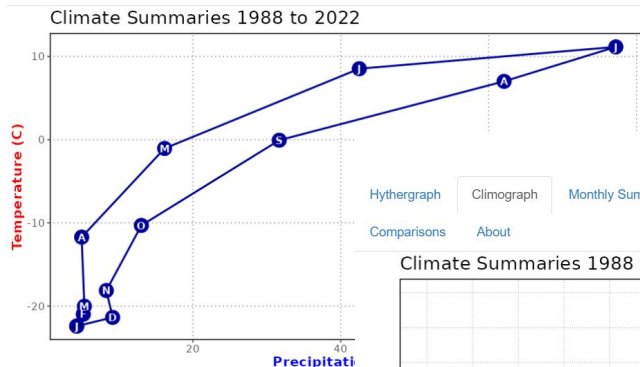
Create climate summaries by selecting a date range of interest

Year

1988 2022

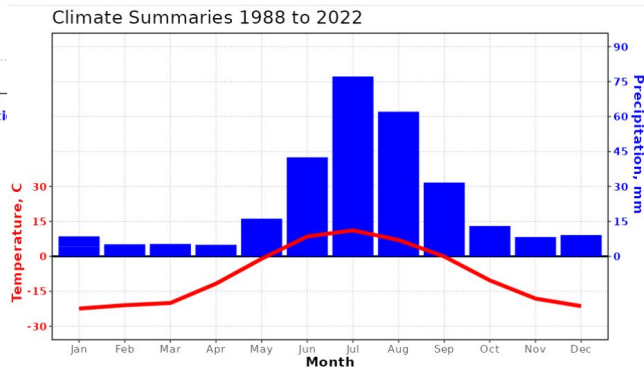
Hythergraph Climograph Monthly Summaries Seasonal Summaries Yearly Summaries

Comparisons About



Hythergraph Climograph Monthly Summaries Seasonal Summaries Yearly Summaries

Comparisons About



Hythergraph Climograph Monthly Summaries Seasonal Summaries Yearly Summaries

Month	Temp (Mean)	Precip (Sum)	% Temp Data	% Precip data
January	-22.40	4.29	98.24	50.93
February	-20.97	5.18	97.00	49.36
March	-20.02	5.32	96.97	44.87
April	-11.71	4.96	94.71	55.59
May	-1.05	16.17	94.97	82.54
June	8.54	42.50	94.10	93.33
July	11.16	77.20	94.93	97.05
August	7.02	62.09	93.46	95.48
September	-0.06	31.68	99.80	89.80
October	-10.30	13.03	100.00	72.20
November	-18.13	8.30	100.00	66.86
December	-21.36	9.15	100.00	69.54

[Interactive climate summaries tool](#)
[Toolik climate summaries GitHub code](#)



Network Participation

Atmospheric Monitoring



- Ozone Monitoring – 2009 to Present (ADC repository of data)
- National Atmospheric Deposition program (NADP) – 2017 to present
 - National Trends Network
 - Mercury Deposition Network
 - Ammonia Monitoring Network
- Inter-agency Monitoring of Protected Visual Environments (IMPROVE) – 2018 to present
 - Re-funded by the BLM until 2064
- Purple Air – June 2019 to present
 - Particulate matter sampling
 - 2 additional sensors added in 2022
- Mercury Passive Air Sampler – January 2020 to present
 - Changed quarterly
 - Lower than average Mercury for the Arctic



Network Participation



LIFEPLAN – A Planetary Inventory of Life

- Weekly spore sampling
- Camera and audio traps
 - Community training of AI to process data
 - Audio traps
- Malaise trap
- Soil sampling



myThaw

- Weekly NDVI/snow survey transect
- Thaw depth, veg height, snow depth
- Data collected is online at permafrostthaw.org



CoCoRaHS – Community Collaborative Rain, Hail & Snow Monitoring

- Daily record of precipitation and snow water equivalency



Aurorasaurus

- Observations of aurora activity
- Toolik is an Ambassador member



Fresh Eyes on Ice

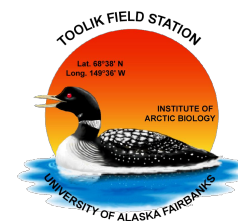
- Monthly ice measurements





Remote Access

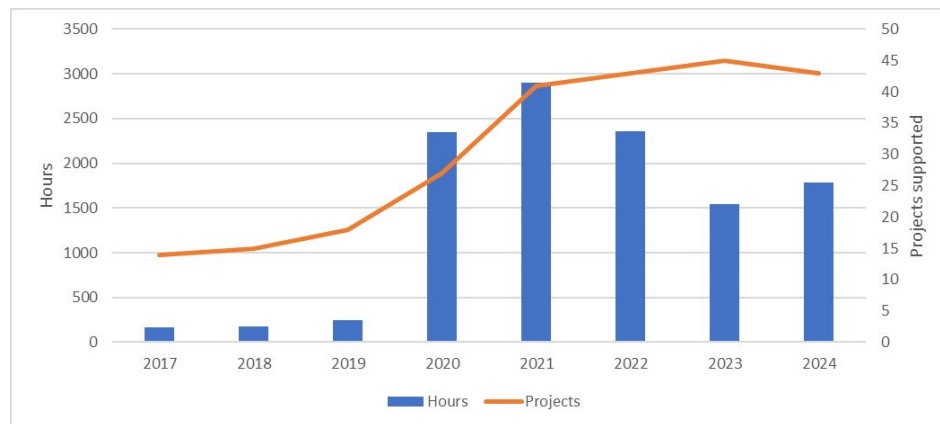
Field Work Assistance



- 2017: 170 hours of assistance to 14 projects for 14 different researchers.
- 2018: 179 hours of assistance to 15 projects for 14 different researchers.
- 2019: 242 hours of assistance to 18 projects for 29 different researchers.
- 2020: 2344 hours of assistance to 27 projects
- 2021: 2899 hours of assistance to 41 projects
- 2022: 2361 hours of assistance to 43 projects
- 2023: 1543 hours of assistance to 45 projects
- **2024: 1783 hours of assistance to 43 projects**

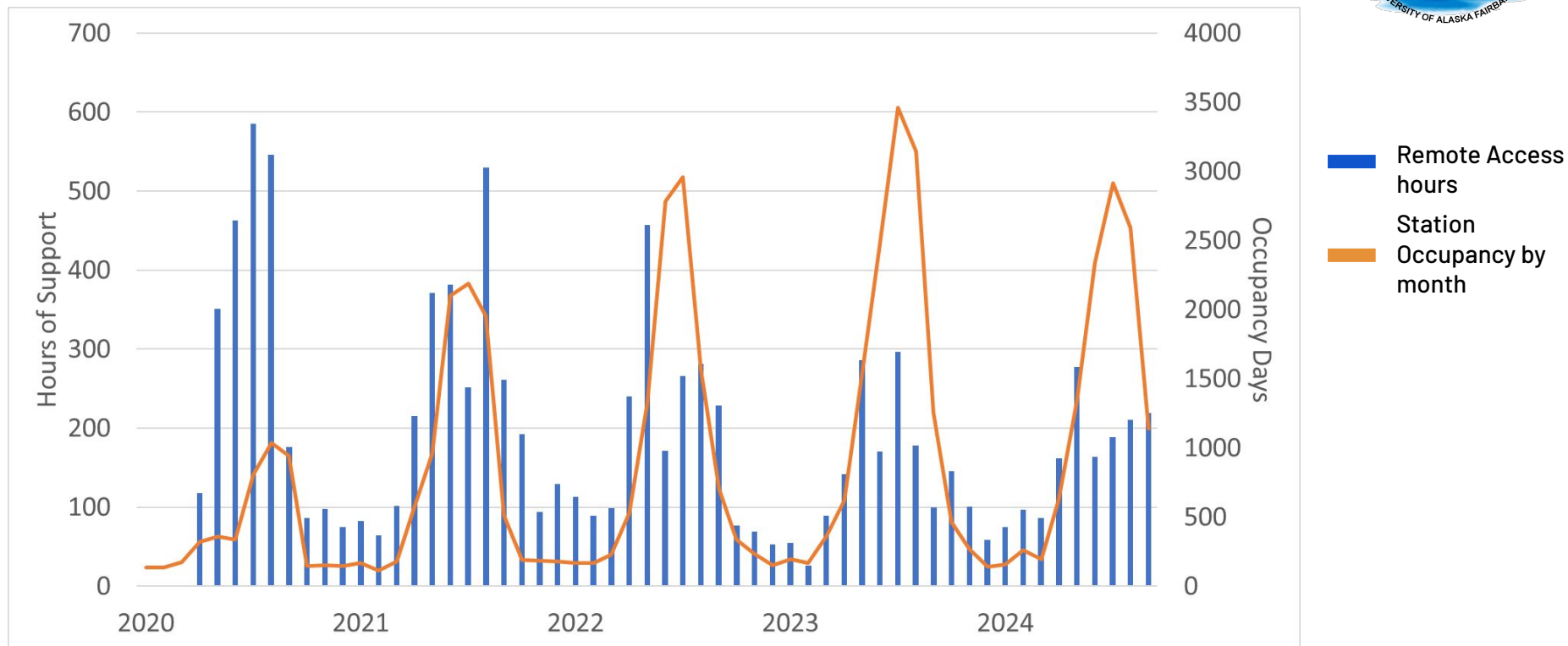
Examples of assistance (Not exhaustive):

- Met Station setup, downloads, and troubleshooting
- Phenology and NDVI measurements
- River discharge and water chem processing
- Soil sampling
- Tussock tiller measurements

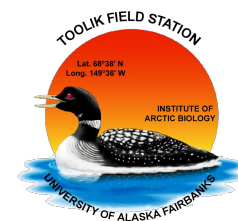


*Not all projects supported have hours recorded

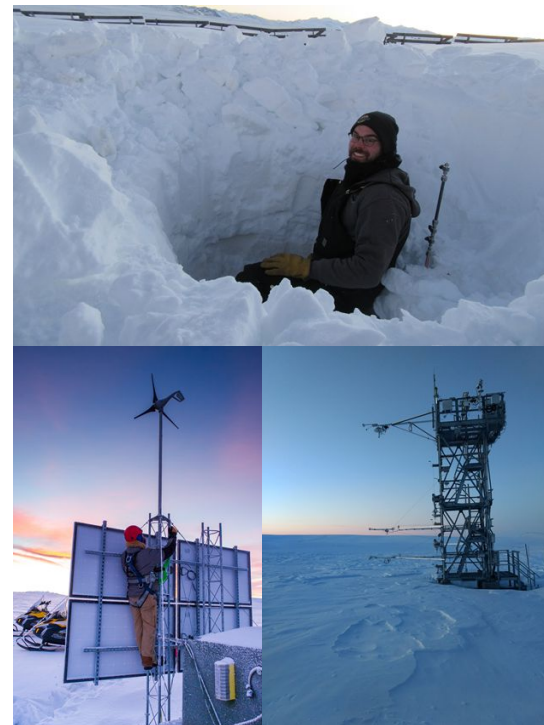
Support Hours Through Sept 2024



Winter Remote Access



- 20-40 hours of remote access per week.
- EDC staff at Toolik year-round working with Maintenance staff
- Activities:
 - Autonomous equipment
 - Preventative maintenance checks
 - Data download
 - Power system charging and repairs
 - Sensor swap
 - Snow depth measurements
 - Lake ice
 - Ice thickness measurements
 - Sonde casts
 - Water sampling and filtering
 - Atmospheric measurements
 - Access assistance via snowmachines





Other

EDC Website



- Abiotic

- Weather
- Met Station Data Query
- Snow
- Ice Thickness
- Atmospheric
- Time Lapse
- Other

- Biotic

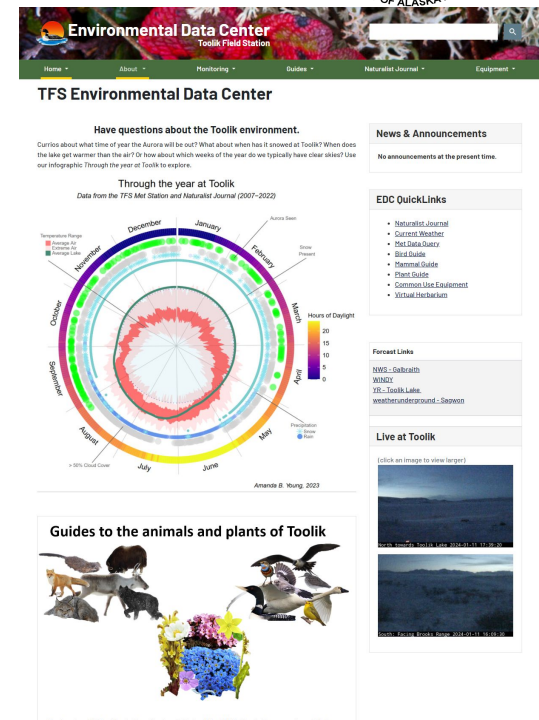
- Bird Point Counts
- Plant Phenology
- NDVI Measurements

- Guides

- Mammals
- Birds
- Fish
- Plants
- Virtual Herbarium

- Naturalist Journal

- Annual Summaries



What do you wish to see added?

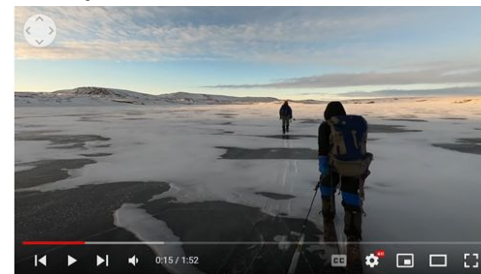
Meetings and Outreach

- Meetings
 - American Geophysical Union
 - Exhibit Hall booth
 - ICARP IV
 - International Conference on Arctic Research Planning
 - Organization of Biological Field Stations Annual Meeting
- Tours of Toolik
 - North for Science!
 - Artists in Residence

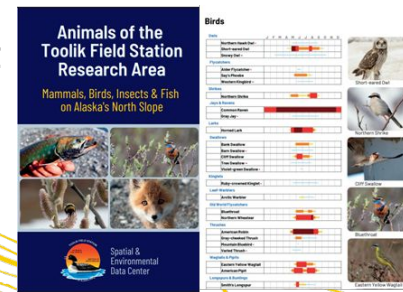


Outreach Deliverables

- [Immersive videos](#) (360° & VR)
 - Link – best viewed in a VR headset or smartphone with resolution set to 4k



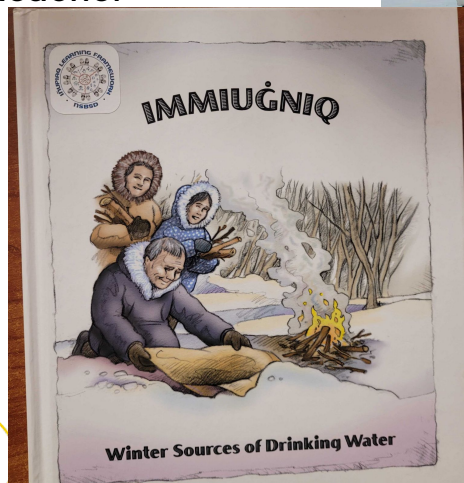
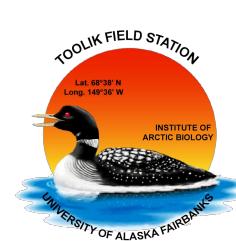
- Toolik Animal Checklist

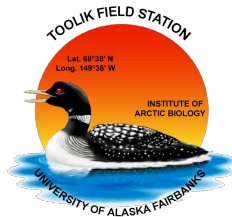


What other kinds of deliverables would you like to see?

Meetings and Outreach

- Anaktuvuk Pass School Visit
 - April 22-25, 2024
 - Snow Science Curriculum based off of the Fresh Eyes on Ice but for snow
 - K-12 students, primarily with 7-8th grades
 - Home room teacher & Inupiaq teacher





Trainings & Workshops

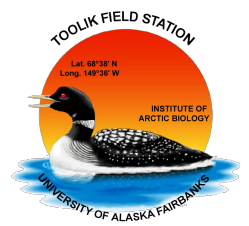
- ADC - Fundamentals in Data Management for Qualitative and Quantitative Arctic Research (spring 2024 Abby)
- ADC - Reproducible Approaches to Arctic Research Using R (Spring 2024 Mayra)
- Polar Geospatial Center - Getting Started with PGC Data Workshop (Spring 2024 Abby)
- The Virtual Field (2023-2024)
 - Online (Amanda, Haley, Mayra), in person meeting (Mayra summer 2024)

Upcoming

- Avalanche Training (Spring 2025 Abby)



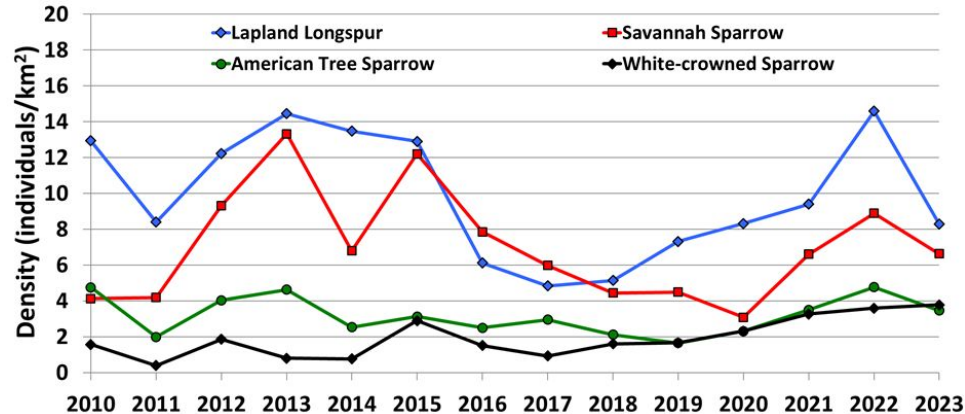
Let me know if you have any feedback



ayoung55@alaska.edu

uaf-iab-toolik-edc@alaska.edu

Baseline Datasets



Remote Access and Field Support

